

Do FinTech Mortgage Lenders Fill the Credit Gap? Evidence from Natural Disasters

Internet Appendix

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A. Lender Classification

A lender is categorized as a traditional bank if its regulator is the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation (FDIC), the Office of Thrift Supervision, the National Credit Union Administration, or the Consumer Financial Protection Bureau (CFPB). A lender is categorized as a shadow bank if its regulator is the Department of Housing and Urban Development (HUD). For the Federal Reserve System (FRS) regulated lenders, we match them with the Federal Financial Institutions Examination Council National Information Center using their Replication Server System Database IDs and find their entity types. A lender is then categorized as a traditional bank if its entity type is one of the followings: “Domestic Branch of a Domestic Bank,” “Federal Credit Union,” “Federal Savings Bank,” “National Bank,” “Non-member Bank,” “State Credit Union,” “Savings & Loan Association,” “State Member Bank,” “State Savings Bank,” “Uninsured State Branch of an FBO,” and “Cooperative Bank.” A lender is categorized as a shadow bank if its entity type is one of the followings: “Domestic Entity Other” and “Finance Company.” For those FRS regulated lenders whose entity types are missing, we manually identify their category. We then make the following adjustments to the lender classification. First, Merrimack Mortgage Company (regulated by FDIC) and SunTrust Mortgage (regulated by CFPB) are categorized as shadow banks because they did not have deposits. Second, Homeowners Mortgage Enterprise, Liberty Mortgage Corporation, Morgan Stanley Credit Corp, and Prosperity Mortgage Company are categorized as traditional banks although they are regulated by the HUD.

Table IA1: Robustness Test: Shifts in Mortgage Demand Curves — Excluding Disasters Occurring in the Fourth Quarter

This table examines exogenous shifts in demand curves by analyzing mortgage applications for natural disasters occurring during the first to third calendar quarters each year. APPLICATIONS is the natural logarithm of the annual number of mortgage applications by county. TREAT is a dummy variable that equals one for disaster-affected counties, and zero for control counties. POST is a dummy variable that equals one for the year of the disaster, and zero for the preceding year. BRANCH is the number of bank branches per 1,000 population by county. DEPOSITS is the amount of deposits per capita by county. HHI is the Herfindahl-Hirschmann index of deposits by county. C3 is the share of deposits in the three largest banks by county. UNEMP is the share of the labor force that is unemployed. POP is the population by county. WHITE is the share of white people by county. FEMALE is the share of female people by county. EDUCATION is the share of population over 25 years that is with high school or higher education. INCOME_PER_CAP is income per capita. SENIOR is the share of population that is over 65 years old. MANUFACTURE is the share of the labor force working in the manufacturing industry. INFORMATION is the share of the labor force working in the information industry. INTERNET is the share of households with residential fixed connections over 200kbps in at least one direction. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	APPLICATIONS			
	1	2	3	4
	FinTechs	Shadow Banks	Trad. Banks	All Lenders
TREAT × POST	0.095*** (4.676)	0.055*** (3.213)	0.061*** (6.373)	0.059*** (6.394)
TREAT	0.036 (1.157)	0.059** (2.179)	0.047** (2.186)	0.051** (2.442)
POST	-0.166*** (-14.048)	-0.305*** (-29.004)	-0.244*** (-35.781)	-0.228*** (-35.517)
BRANCH	-0.002*** (-12.697)	-0.002*** (-17.347)	-0.002*** (-22.714)	-0.002*** (-23.352)
DEPOSITS	0.014*** (5.930)	0.009*** (3.311)	0.009*** (3.781)	0.007*** (2.773)
HHI	-0.257 (-1.095)	-0.603*** (-3.788)	-1.036*** (-8.248)	-1.221*** (-10.216)
C3	-2.009*** (-10.932)	-2.155*** (-14.367)	-2.489*** (-19.835)	-2.433*** (-20.070)
UNEMP	3.855*** (4.398)	2.652*** (3.578)	2.649*** (5.123)	2.919*** (5.642)
POP	1.345*** (9.591)	1.587*** (9.652)	1.559*** (9.541)	1.638*** (9.797)
WHITE	0.288 (1.636)	-0.159 (-1.049)	0.431*** (3.186)	0.389*** (2.917)
FEMALE	8.073*** (7.607)	4.906*** (5.462)	5.198*** (7.705)	4.833*** (7.001)
EDUCATION	1.642*** (2.629)	1.438** (2.473)	2.797*** (7.295)	2.780*** (7.156)
INCOME_PER_CAP	0.041*** (4.746)	0.054*** (5.392)	0.035*** (5.641)	0.040*** (6.363)
SENIOR	-2.564*** (-5.162)	-2.342*** (-4.699)	-3.879*** (-8.927)	-3.548*** (-8.059)
MANUFACTURE	-0.453 (-1.383)	-0.476* (-1.833)	0.091 (0.369)	0.217 (0.930)
INFORMATION	6.571* (1.696)	10.171*** (3.105)	3.024 (1.613)	3.135* (1.710)
INTERNET	0.209*** (7.406)	0.236*** (9.665)	0.167*** (9.007)	0.178*** (9.778)
State × Disaster Year FE	Yes	Yes	Yes	Yes
Observations	4,160	7,318	10,300	10,544
Adjusted R^2	0.810	0.808	0.847	0.860

Table IA2: Robustness Test: Shifts in Mortgage Demand Curves — Alternative Applications Measures and Samples

This table uses different specifications of mortgage applications to measure post-disaster demand curve shifts. APPLICATIONS is the natural logarithm of the annual number of mortgage applications by county. VOLUME is the natural logarithm of the total dollar value of mortgage applications. APL_PER_CAP is the number of mortgage applications scaled by local population. VOLUME_PER_CAP is the dollar value of mortgage applications per capita. TREAT is a dummy variable that equals one for disaster-affected counties, and zero for control counties. POST is a dummy variable that equals one for the year of the disaster, and zero for the preceding year. For each panel, columns 1 to 4 include mortgages of all purposes and columns 5 to 8 only include refinance and home improvement applications. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

Panel A		APPLICATIONS							
		All Purposes				Refinance and Home Improvement			
		1	2	3	4	5	6	7	8
		FinTech	Shadow	Bank	All Lenders	FinTech	Shadow	Bank	All Lenders
TREAT × POST		0.044*** (2.637)	0.016 (1.237)	0.025*** (3.426)	0.022*** (3.120)	0.078*** (4.069)	0.055*** (3.394)	0.050*** (5.454)	0.048*** (5.464)
TREAT		0.048* (1.666)	0.075*** (2.871)	0.048** (2.305)	0.057*** (2.842)	0.041 (1.387)	0.049* (1.891)	0.041** (2.007)	0.044** (2.147)
POST		-0.055*** (-5.110)	-0.147*** (-16.712)	-0.153*** (-26.763)	-0.131*** (-22.942)	-0.136*** (-11.665)	-0.265*** (-26.282)	-0.225*** (-34.105)	-0.204*** (-32.351)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects				State × Disaster	Year				
Observations		4,994	8,692	11,656	11,816	4,586	7,968	11,296	11,562
Adjusted R ²		0.811	0.823	0.853	0.866	0.810	0.811	0.848	0.861
Panel B		VOLUME							
		All Purposes				Refinance and Home Improvement			
		1	2	3	4	5	6	7	8
		FinTech	Shadow	Bank	All Lenders	FinTech	Shadow	Bank	All Lenders
TREAT × POST		0.058*** (3.189)	0.024* (1.769)	0.034*** (3.928)	0.030*** (3.599)	0.094*** (4.608)	0.072*** (4.103)	0.068*** (5.900)	0.066*** (6.101)
TREAT		0.042 (1.380)	0.081*** (2.876)	0.053** (2.400)	0.067*** (3.074)	0.039 (1.241)	0.048* (1.716)	0.040* (1.789)	0.049** (2.211)
POST		-0.095*** (-8.088)	-0.164*** (-17.838)	-0.188*** (-28.531)	-0.158*** (-24.019)	-0.183*** (-14.362)	-0.299*** (-27.864)	-0.297*** (-37.484)	-0.260*** (-34.859)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects				State × Disaster	Year				
Observations		4,994	8,692	11,656	11,816	4,586	7,968	11,296	11,562
Adjusted R ²		0.825	0.834	0.862	0.872	0.826	0.824	0.859	0.868
Panel C		APL_PER_CAP							
		All Purposes				Refinance and Home Improvement			
		1	2	3	4	5	6	7	8
		FinTech	Shadow	Bank	All Lenders	FinTech	Shadow	Bank	All Lenders
TREAT × POST		56.678** (2.486)	92.657** (2.020)	381.421*** (3.603)	463.821*** (3.548)	78.281*** (3.445)	140.937*** (3.188)	472.862*** (4.662)	584.909*** (4.693)
TREAT		-88.746*** (-3.033)	182.980** (2.410)	-404.237** (-2.236)	-249.046 (-1.190)	-78.066*** (-3.234)	67.462 (1.336)	-295.209** (-2.083)	-226.038 (-1.380)
POST		-64.386*** (-4.789)	-446.727*** (-11.667)	-2234.883*** (-29.390)	-2530.965*** (-27.309)	-147.838*** (-11.742)	-580.574*** (-22.188)	-2370.745*** (-33.296)	-2780.604*** (-32.755)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects				State × Disaster	Year				
Observations		4,994	8,692	11,656	11,816	4,586	7,968	11,296	11,562
Adjusted R ²		0.532	0.587	0.592	0.612	0.519	0.542	0.637	0.631
Panel D		VOLUME_PER_CAP							
		All Purposes				Refinance and Home Improvement			
		1	2	3	4	5	6	7	8
		FinTech	Shadow	Bank	All Lenders	FinTech	Shadow	Bank	All Lenders
TREAT × POST		15.455*** (3.314)	30.073*** (3.169)	70.189*** (3.964)	99.969*** (4.165)	17.990*** (3.869)	36.722*** (3.969)	83.899*** (4.958)	116.875*** (5.120)
TREAT		-17.265** (-2.509)	50.964*** (2.750)	-48.300 (-1.536)	-1.713 (-0.041)	-14.676*** (-2.611)	21.333* (1.769)	-30.473 (-1.234)	-5.153 (-0.161)
POST		-18.752*** (-6.460)	-86.907*** (-11.497)	-365.694*** (-26.390)	-437.638*** (-24.207)	-33.510*** (-12.004)	-111.999*** (-19.290)	-382.670*** (-29.569)	-472.463*** (-28.366)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects				State × Disaster	Year				
Observations		4,994	8,692	11,656	11,816	4,586	7,968	11,296	11,562
Adjusted R ²		0.590	0.645	0.628	0.663	0.598	0.615	0.639	0.645

Table IA3: Robustness Test: Comparing Post-Disaster Shifts in Mortgage Demand for New Purchases, Refinancing and Home Improvement

This table presents the estimated results of a multinomial logit regression distinguishing between purposes (new purchase, refinance, or home improvement) for traditional bank mortgage applications before and after natural disasters. The dependent variable is an indicator variable equal to (i) zero if the purpose of the loan is new purchase; (ii) one if the purpose of the loan is refinance; and (iii) two if the purpose of the loan is home improvement. The base case is new purchase. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	1	2
	Refinance	Home Improvement
TREAT \times POST	0.135*** (4.396)	0.076*** (4.120)
TREAT	-0.051** (-2.536)	-0.062** (-2.439)
POST	-0.375*** (-26.675)	-0.074*** (-7.344)
Controls	Yes	Yes
State \times Disaster Year FE	Yes	Yes
Ethnicity FE	Yes	Yes
Race FE	Yes	Yes
Gender FE	Yes	Yes
Observations	16,759,690	16,759,690
Pesudo R^2	0.226	0.226

Table IA4: Robustness Test: Shifts in Mortgage Demand Curves — Including Only Under-Insured Water-Related Disasters, e.g., Severe Storms, Floods, and Hurricanes

This table examines exogenous shifts in demand curves by analyzing mortgage applications for natural disasters that are water-related, including severe storms, floods, and hurricanes. APPLICATIONS is the natural logarithm of the annual number of mortgage applications by county. TREAT is a dummy variable that equals one for disaster-affected counties, and zero for control counties. POST is a dummy variable that equals one for the year of the disaster, and zero for the preceding year. BRANCH is the number of bank branches per 1,000 population by county. DEPOSITS is the amount of deposits per capita by county. HHI is the Herfindahl-Hirschmann index of deposits by county. C3 is the share of deposits in the three largest banks by county. UNEMP is the share of the labor force that is unemployed. POP is the population by county. WHITE is the share of white people by county. FEMALE is the share of female people by county. EDUCATION is the share of population over 25 years that is with high school or higher education. INCOME_PER_CAP is income per capita. SENIOR is the share of population that is over 65 years old. MANUFACTURE is the share of the labor force working in the manufacturing industry. INFORMATION is the share of the labor force working in the information industry. INTERNET is the share of households with residential fixed connections over 200kbps in at least one direction. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	APPLICATIONS			
	1	2	3	4
	FinTechs	Shadow Banks	Trad. Bank	All Lenders
TREAT × POST	0.088*** (4.405)	0.031* (1.756)	0.039*** (4.314)	0.037*** (4.200)
TREAT	0.001 (0.029)	0.020 (0.782)	0.039* (1.854)	0.036* (1.750)
POST	-0.096*** (-7.884)	-0.241*** (-22.061)	-0.195*** (-29.415)	-0.176*** (-27.577)
BRANCH	-0.002*** (-12.004)	-0.002*** (-17.267)	-0.002*** (-23.123)	-0.002*** (-23.931)
DEPOSITS	0.014*** (5.578)	0.009*** (3.154)	0.008*** (3.123)	0.006** (2.286)
HHI	-0.256 (-0.896)	-0.587*** (-3.447)	-0.969*** (-7.931)	-1.169*** (-9.795)
C3	-1.921*** (-8.992)	-2.107*** (-13.141)	-2.562*** (-20.314)	-2.496*** (-20.205)
UNEMP	3.599*** (3.798)	2.339*** (3.036)	3.079*** (5.988)	3.345*** (6.550)
POP	1.298*** (8.363)	1.508*** (8.657)	1.506*** (8.756)	1.585*** (8.931)
WHITE	0.332* (1.658)	-0.149 (-0.925)	0.471*** (3.383)	0.449*** (3.244)
FEMALE	8.732*** (7.155)	5.133*** (5.417)	5.383*** (8.157)	4.962*** (7.713)
EDUCATION	1.590** (2.159)	1.539** (2.457)	2.987*** (7.605)	2.974*** (7.606)
INCOME_PER_CAP	0.042*** (4.285)	0.057*** (5.221)	0.038*** (6.034)	0.044*** (6.727)
SENIOR	-2.607*** (-5.157)	-2.472*** (-4.973)	-4.166*** (-9.436)	-3.849*** (-8.651)
MANUFACTURE	-0.295 (-0.841)	-0.490* (-1.843)	0.167 (0.683)	0.278 (1.194)
INFORMATION	8.243* (1.873)	12.001*** (3.424)	4.211** (2.267)	4.229** (2.254)
INTERNET	0.239*** (8.062)	0.242*** (9.856)	0.169*** (9.116)	0.180*** (9.939)
State × Disaster Year FE	Yes	Yes	Yes	Yes
Observations	3916	7094	10342	10590
Adjusted R ²	0.806	0.802	0.847	0.860

Table IA5: Robustness Test: Shifts in Mortgage Supply Curves – Alternative Samples

This table uses mortgage approvals to measure post-disaster shifts in supply curves. APPROVED is a dummy variable that equals one for approved loans, and zero otherwise. TREAT is a dummy variable that equals one for disaster-affected counties, and zero for control counties. POST is a dummy variable that equals one for the year of the disaster, and zero for the preceding year. FINTECH is a dummy variable that equals one if the application is submitted to a FinTech lender, and zero otherwise. $\ln(\text{INCOME})$ is the natural logarithm of the applicant's annual income. $\ln(\text{AMT})$ is the natural logarithm of mortgage amount. BRANCH is the number of bank branches per 1,000 population by county. DEPOSITS is the amount of deposits per capita by county. HHI is the Herfindahl-Hirschmann index of deposits by county. C3 is the share of deposits in the three largest banks by county. UNEMP is the share of the labor force that is unemployed. POP is the population by county. WHITE is the share of white people by county. FEMALE is the share of female people by county. EDUCATION is the share of population over 25 years that is with high school or higher education. INCOME_PER_CAP is income per capita. SENIOR is the share of population that is over 65 years old. MANUFACTURE is the share of the labor force working in the manufacturing industry. INFORMATION is the share of the labor force working in the information industry. INTERNET is the share of households with residential fixed connections over 200 kbps in at least one direction. Panel A reports the results of DID regressions, where columns 1 to 3 report applications of all purposes and columns 4 to 6 report applications of refinance and home improvement. Panel B examines whether the approval likelihood are different across lender types by adding one more difference to the regression, FINTECH, a dummy variable that equals one if the application is submitted to a FinTech lender, and zero otherwise. Columns 1 and 3 only include FinTech and non-FinTech shadow bank applications and columns 2 and 4 only include FinTech and traditional bank applications. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

Panel A	APPROVED					
	All Purposes			Refinance and Home Improvement		
	1	2	3	4	5	6
	FinTech	Shadow Bank	Trad. Bank	FinTech	Shadow Bank	Trad. Bank
TREAT × POST	0.053** (2.051)	-0.078** (-1.965)	0.028*** (2.662)	0.069** (2.249)	0.001 (0.023)	0.047*** (3.165)
TREAT	0.007 (0.329)	0.087*** (3.028)	0.006 (0.477)	-0.005 (-0.212)	0.051* (1.755)	0.002 (0.165)
POST	-0.167*** (-9.969)	0.020 (0.704)	-0.012* (-1.704)	-0.214*** (-12.073)	-0.116*** (-3.890)	-0.070*** (-8.121)
$\ln(\text{INCOME})$	0.318*** (23.468)	0.683*** (68.997)	0.460*** (54.737)	0.339*** (21.836)	0.662*** (70.684)	0.456*** (48.649)
$\ln(\text{AMT})$	-0.024 (-1.484)	-0.028 (-1.614)	0.254*** (29.784)	-0.089*** (-4.923)	-0.013 (-0.985)	0.188*** (20.126)
BRANCH	-0.001*** (-7.220)	-0.001*** (-5.760)	-0.000** (-2.039)	-0.001*** (-6.094)	-0.001*** (-5.136)	0.000 (0.530)
DEPOSITS	0.001 (1.415)	0.004*** (3.397)	0.002*** (3.169)	0.001 (0.702)	0.002* (1.758)	0.001 (0.910)
HHI	0.054 (0.565)	0.009 (0.065)	0.008 (0.092)	0.091 (1.006)	0.085 (0.593)	0.106 (1.309)
C3	-0.135 (-1.091)	-0.462*** (-3.139)	-0.026 (-0.343)	-0.215* (-1.853)	-0.413*** (-3.449)	0.010 (0.138)
UNEMP	-0.446 (-0.731)	-0.875 (-1.180)	-2.935*** (-7.281)	-0.601 (-0.853)	-0.944 (-1.501)	-2.466*** (-5.851)
POP	0.020 (1.302)	-0.011 (-0.510)	-0.047*** (-3.965)	0.030** (2.142)	0.007 (0.435)	-0.023*** (-2.638)
WHITE	0.119 (1.212)	-0.037 (-0.252)	0.050 (0.651)	0.128 (1.453)	-0.139 (-1.272)	0.151* (1.847)
FEMALE	2.830*** (4.756)	2.199 (1.533)	1.817*** (3.605)	2.571*** (3.924)	2.072*** (2.197)	1.390*** (2.723)
EDUCATION	1.022*** (3.177)	1.732*** (4.781)	1.882*** (9.580)	0.658** (1.987)	0.808** (2.471)	1.620*** (8.185)
INCOME_PER_CAP	0.007** (2.007)	0.007* (1.956)	-0.011*** (-6.657)	0.011*** (2.812)	0.013*** (4.004)	-0.007*** (-4.187)
SENIOR	-0.748*** (-2.637)	-0.208 (-0.237)	-0.637*** (-2.661)	-0.910*** (-2.970)	-0.574 (-1.196)	-0.919*** (-4.379)
MANUFACTURE	0.173 (1.112)	0.250 (0.975)	0.936*** (6.958)	0.301* (1.862)	0.395* (1.844)	1.094*** (7.820)
INFORMATION	2.383 (1.613)	6.750*** (3.248)	-1.481 (-1.358)	2.272 (1.473)	9.220*** (4.902)	-0.907 (-0.829)
INTERNET	0.029** (1.976)	0.067*** (3.221)	-0.030*** (-2.929)	0.016 (1.005)	0.022 (1.198)	-0.037*** (-3.206)
State × Disaster Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity FE	Yes	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes	Yes
Gender FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,383,139	5,742,252	16,759,690	1,094,721	3,248,888	12,054,996
Pseudo R^2	0.029	0.073	0.069	0.030	0.101	0.065

Panel B	APPROVED			
	All Purposes		Refinance and Home Improvement	
	1 Shadow Bank and FinTech	2 Trad. Bank and FinTech	3 Shadow Bank and FinTech	4 Trad. Bank and FinTech
TREAT × POST × FINTECH	0.137*** (2.894)	0.050 (1.594)	0.085* (1.726)	0.054 (1.524)
TREAT × POST	-0.075* (-1.920)	0.028*** (2.662)	-0.001 (-0.019)	0.046*** (3.176)
TREAT × FINTECH	-0.018 (-0.516)	0.017 (0.347)	0.048 (1.104)	0.011 (0.255)
POST × FINTECH	-0.172*** (-5.159)	-0.144*** (-8.677)	-0.071* (-1.935)	-0.123*** (-6.762)
TREAT	0.073*** (2.644)	0.004 (0.298)	0.030 (0.969)	-0.000 (-0.030)
POST	0.015 (0.555)	-0.013* (-1.797)	-0.125*** (-4.154)	-0.071*** (-8.301)
FINTECH	0.071** (2.393)	0.103*** (2.961)	0.410*** (11.003)	0.237*** (7.069)
ln(INCOME)	0.609*** (60.809)	0.445*** (53.194)	0.592*** (58.791)	0.443*** (47.517)
ln(AMT)	-0.025 (-1.619)	0.249*** (29.492)	-0.033*** (-2.598)	0.185*** (19.886)
BRANCH	-0.001*** (-6.043)	-0.000** (-2.442)	-0.001*** (-5.737)	0.000 (0.061)
DEPOSITS	0.003*** (2.992)	0.002*** (3.277)	0.002 (1.546)	0.001 (1.079)
HHI	0.036 (0.297)	0.010 (0.127)	0.090 (0.735)	0.097 (1.302)
C3	-0.398*** (-2.890)	-0.029 (-0.392)	-0.363*** (-3.260)	-0.002 (-0.023)
UNEMP	-0.703 (-1.013)	-2.733*** (-6.662)	-0.932 (-1.522)	-2.321*** (-5.408)
POP	-0.002 (-0.084)	-0.040*** (-3.545)	0.013 (0.951)	-0.017** (-2.044)
WHITE	0.001 (0.006)	0.061 (0.802)	-0.077 (-0.780)	0.152* (1.950)
FEMALE	2.302* (1.890)	1.874*** (3.850)	2.184*** (2.669)	1.460*** (2.962)
EDUCATION	1.613*** (4.684)	1.859*** (9.810)	0.765** (2.457)	1.573*** (8.209)
INCOME_PER_CAP	0.007* (1.941)	-0.010*** (-6.528)	0.012*** (3.841)	-0.006*** (-3.840)
SENIOR	-0.313 (-0.418)	-0.664*** (-2.846)	-0.632 (-1.513)	-0.933*** (-4.474)
MANUFACTURE	0.224 (0.969)	0.915*** (7.082)	0.379* (1.941)	1.077*** (8.064)
INFORMATION	5.859*** (3.137)	-1.271 (-1.248)	7.636*** (4.435)	-0.723 (-0.699)
INTERNET	0.057*** (3.187)	-0.026** (-2.565)	0.019 (1.134)	-0.033*** (-2.882)
State × Disaster Year FE	Yes	Yes	Yes	Yes
Ethnicity FE	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes
Gender FE	Yes	Yes	Yes	Yes
Observations	7,124,730	18,135,507	4,343,193	13,145,645
Pseudo R^2	0.060	0.064	0.081	0.061

Table IA6: Robustness Test: Post-Disaster Mortgage Supply Curve Shifts for Conforming and Jumbo Loans

This table analyzes post-disaster conforming and jumbo loans approved by traditional banks. APPROVED is a dummy variable that equals one for approved loans, and zero otherwise. TREAT is a dummy variable that equals one for disaster-affected counties, and zero for control counties. POST is a dummy variable that equals one for the year of the disaster, and zero for the preceding year. JUMBO is a dummy variable that equals one if the loan is a jumbo loan, and zero if it is a conforming loan. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	APPROVED	
	1	2
	All Purposes	Refinance and Home Improvement
TREAT \times POST \times JUMBO	0.030 (1.038)	0.103** (2.460)
TREAT \times POST	0.029*** (2.718)	0.047*** (3.073)
TREAT \times JUMBO	0.039 (0.681)	0.016 (0.259)
POST \times JUMBO	0.086*** (3.824)	0.052 (1.578)
TREAT	-0.001 (-0.072)	-0.004 (-0.262)
POST	-0.011 (-1.571)	-0.069*** (-8.045)
JUMBO	-0.932*** (-18.112)	-1.060*** (-17.676)
Controls	Yes	Yes
State \times Disaster Year FE	Yes	Yes
Ethnicity FE	Yes	Yes
Race FE	Yes	Yes
Gender FE	Yes	Yes
Observations	17,257,354	12,201,881
Pseudo R^2	0.067	0.064

Table IA7: Robustness Test: Post-Disaster Supply Elasticity Shifts — Loan-to-Income Ratios for Loans of All Purposes

This table examines post-disaster mortgage supply elasticity by measuring loan-to-income ratios. All loan purposes (new purchase, refinance, and home improvement) are included in the regression. LTI the borrower's loan-to-income ratio, calculated as the mortgage amount divided by the borrower's annual income. TREAT is a dummy variable that equals one for disaster-affected counties, and zero for control counties. POST is a dummy variable that equals one for the year of the disaster, and zero for the preceding year. FINTECH is a dummy variable that equals one if the application is submitted to a FinTech lender, and zero otherwise. BRANCH is the number of bank branches per 1,000 population by county. DEPOSITS is the amount of deposits per capita by county. HHI is the Herfindahl-Hirschmann index of deposits by county. C3 is the share of deposits in the three largest banks by county. UNEMP is the share of the labor force that is unemployed. POP is the population by county. WHITE is the share of white people by county. FEMALE is the share of female people by county. EDUCATION is the share of population over 25 years that is with high school or higher education. INCOME_PER_CAP is income per capita. SENIOR is the share of population that is over 65 years old. MANUFACTURE is the share of the labor force working in the manufacturing industry. INFORMATION is the share of the labor force working in the information industry. INTERNET is the share of households with residential fixed connections over 200 kbps in at least one direction. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	LTI					
	Application Sample		Denial Sample		Approval Sample	
	1	2	3	4	5	6
	Shadow Bank and FinTech	Bank and FinTech	Shadow Bank and FinTech	Bank and FinTech	Shadow Bank and FinTech	Bank and FinTech
TREAT × POST × FINTECH	0.069*** (3.444)	0.075*** (4.004)	0.023 (0.811)	0.055*** (3.453)	0.092*** (3.847)	0.081*** (3.639)
TREAT × POST	0.024** (2.206)	0.018*** (3.045)	0.058** (2.451)	0.024*** (2.604)	0.006 (0.657)	0.018*** (3.237)
TREAT × FINTECH	-0.057** (-2.272)	-0.057* (-1.911)	-0.059 (-1.600)	-0.014 (-0.605)	-0.057** (-2.248)	-0.063** (-2.065)
POST × FINTECH	-0.096*** (-6.952)	-0.023* (-1.712)	-0.165*** (-7.525)	-0.032** (-2.557)	-0.085*** (-5.213)	-0.030* (-1.794)
TREAT	-0.038 (-1.487)	-0.011 (-0.632)	-0.041 (-1.331)	-0.030 (-1.233)	-0.028 (-1.108)	-0.005 (-0.295)
POST	0.032*** (3.865)	-0.039*** (-11.098)	0.043** (2.401)	-0.080*** (-14.591)	0.032*** (5.160)	-0.029*** (-8.519)
FINTECH	-0.060*** (-2.838)	0.453*** (22.088)	-0.324*** (-10.994)	0.580*** (33.655)	0.013 (0.575)	0.420*** (18.442)
BRANCH	-0.000 (-0.649)	-0.000* (-1.779)	-0.000 (-1.286)	0.000 (1.367)	-0.000** (-1.995)	-0.000*** (-2.984)
DEPOSITS	-0.003*** (-2.885)	-0.001 (-1.295)	-0.005*** (-3.556)	-0.003** (-2.028)	-0.002** (-2.256)	-0.001 (-0.937)
HHI	0.120 (0.937)	0.070 (0.728)	0.189 (1.353)	0.232* (1.900)	0.112 (0.881)	0.021 (0.236)
C3	-0.199* (-1.678)	-0.289*** (-3.224)	-0.225* (-1.750)	-0.365*** (-3.022)	-0.238** (-1.992)	-0.268*** (-3.228)
UNEMP	-3.508*** (-4.158)	-2.031*** (-3.245)	-4.338*** (-4.604)	-3.403*** (-4.152)	-3.396*** (-4.094)	-1.714*** (-3.011)
POP	0.042** (2.149)	0.063*** (3.745)	0.058** (2.288)	0.069*** (3.105)	0.039** (2.232)	0.059*** (3.926)
WHITE	-0.196 (-1.070)	-0.081 (-0.590)	-0.270 (-1.432)	-0.149 (-0.815)	-0.174 (-0.954)	-0.078 (-0.646)
FEMALE	-0.019 (-0.020)	-0.439 (-0.760)	-0.231 (-0.296)	-1.021 (-1.388)	0.234 (0.260)	-0.091 (-0.167)
EDUCATION	-1.331*** (-3.815)	-0.913*** (-3.236)	-1.688*** (-4.514)	-1.558*** (-4.306)	-1.120*** (-3.129)	-0.700*** (-2.698)
INCOME_PER_CAP	0.009*** (2.824)	0.018*** (6.562)	0.017*** (3.917)	0.026*** (6.916)	0.009*** (2.969)	0.015*** (6.289)
SENIOR	0.533 (1.229)	0.341 (1.324)	1.599*** (3.786)	0.623* (1.762)	0.245 (0.679)	0.207 (0.883)
MANUFACTURE	-0.271 (-1.447)	-0.477*** (-3.439)	-0.567*** (-2.906)	-0.612*** (-3.696)	-0.233 (-1.195)	-0.420*** (-3.052)
INFORMATION	6.495*** (2.990)	4.169** (2.237)	7.576*** (2.787)	4.870* (1.900)	6.870*** (3.355)	3.954** (2.366)
INTERNET	0.005 (0.302)	0.020 (1.637)	0.036* (1.779)	0.019 (1.162)	0.003 (0.193)	0.021* (1.829)
State × Disaster Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity FE	Yes	Yes	Yes	Yes	Yes	Yes
Race FE	Yes	Yes	Yes	Yes	Yes	Yes
Gender FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,124,730	18,135,507	1,390,882	4,054,027	5,733,472	14,081,480
Adjusted R ²	0.062	0.073	0.052	0.070	0.079	0.083

Table IAS: Post-Disaster Mortgage Pricing: Full Model Results

This table presents the complete Table 6. INT_RATE is the original mortgage interest rate minus the return on the 10-year Treasury note. TREAT is a dummy variable that equals one for disaster-affected areas, and zero for control areas. POST is a dummy variable that equals one for the six months following the natural disaster, and zero for the six months before the natural disaster. FINTECH is a dummy variable that equals one for FinTech loans, and zero otherwise. DTI is the borrower's debt-to-income ratio, calculated as the borrower's monthly obligations (including housing expense) divided by her stable monthly income. FICO is the borrower's FICO score. CLTV is the borrower's combined loan-to-value ratio, calculated as all loans secured by the mortgaged property divided by the mortgage amount. TERM is the number of months in which regularly scheduled borrower payments are due under the terms of the related mortgage documents. ln(AMT) is the natural logarithm of the mortgage amount. BRANCH is the number of bank branches per 1,000 population by county. DEPOSITS is the amount of deposits per capita in a county. HHI is the Herfindahl-Hirschmann index of deposits by county. C3 is the share of deposits in the three largest banks by county. UNEMP is the share of the labor force that is jobless. POP is the population by county. WHITE is the share of white people in a county. FEMALE is the share of female people in a county. EDUCATION is the share of population over 25 years that is with high school or higher education. INCOME_PER_CAP is income per capita. SENIOR is the share of population that is over 65 years old. MANUFACTURE is the share of the labor force working in the manufacturing industry. INFORMATION is the share of the labor force working in the information industry. INTERNET is the share of households with residential fixed connections over 200kpbs in at least one direction. Standard errors are clustered at the ZIP Code level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	INT_RATE											
	Refinance		Cash-out Refinance		Non-cash-out Refinance							
	1	2	3	4	5	6	Shadow Bank and FinTech	Shadow Bank and FinTech	Shadow Bank and FinTech	Shadow Bank and FinTech	Shadow Bank and FinTech	Bank and FinTech
TREAT × POST × FinTech	6.214*	-5.715	4.657	-6.656*	6.147	-5.586	(1.807)	(-1.252)	(1.410)	(-1.779)	(1.525)	(-0.953)
TREAT × POST	-17.643***	-6.023	-19.182***	-8.044	-15.254**	-3.708	(-3.077)	(-0.999)	(-3.355)	(-1.541)	(-2.511)	(-0.506)
TREAT × FinTech	-2.106	-0.276	-0.299	0.731	-3.176	-0.167	(-0.837)	(-0.107)	(-0.107)	(0.307)	(-1.238)	(-0.052)
POST × FinTech	-6.640***	-7.219***	-7.097***	-7.083***	-4.895*	-6.154**	(-2.716)	(-3.533)	(-2.975)	(-4.239)	(-1.701)	(-2.240)
TREAT	6.964**	3.845	7.509**	4.910*	6.324*	2.392	(2.138)	(1.271)	(2.171)	(1.816)	(1.860)	(0.655)
POST	3.468	4.878	7.228**	7.758**	-0.538	1.396	(0.943)	(1.346)	(2.017)	(2.559)	(-0.137)	(0.323)
FinTech	13.339***	14.793***	7.413***	9.978***	17.359***	18.470***	(8.005)	(10.578)	(3.539)	(6.753)	(10.649)	(11.774)

DTI	0.104*** (8.050)	0.133*** (8.820)	0.021 (1.112)	0.068*** (3.632)	0.091*** (5.284)	0.104*** (6.724)
FICO	-0.172*** (-41.789)	-0.152*** (-33.320)	-0.199*** (-38.694)	-0.177*** (-44.323)	-0.108*** (-22.962)	-0.083*** (-16.917)
CLTV	0.301*** (20.357)	0.220*** (13.629)	0.413*** (19.411)	0.374*** (16.769)	0.315*** (20.326)	0.186*** (11.304)
TERM	0.411*** (160.362)	0.405*** (133.792)	0.396*** (144.317)	0.389*** (125.010)	0.417*** (128.694)	0.409*** (102.290)
ln(AMT)	-0.090*** (-12.607)	-0.079*** (-10.425)	-0.094*** (-8.431)	-0.092*** (-8.072)	-0.084*** (-17.912)	-0.066*** (-12.457)
BRANCH	-0.017*** (-3.750)	-0.014*** (-3.097)	-0.022*** (-3.422)	-0.020*** (-3.529)	-0.016*** (-2.944)	-0.012*** (-2.572)
DEPOSITS	-0.018 (-1.093)	-0.040** (-2.028)	-0.021 (-0.979)	-0.036 (-1.615)	-0.007 (-0.486)	-0.034* (-1.822)
HHI	14.550** (2.354)	11.684* (1.679)	14.536* (1.834)	11.193 (1.438)	10.657** (2.160)	7.754 (1.250)
C3	-7.993** (-2.212)	-0.990 (-0.261)	-6.660 (-1.477)	-1.289 (-0.289)	-7.752** (-2.057)	0.851 (0.236)
UNEMP	-155.151*** (-6.246)	-107.723*** (-3.875)	-138.896*** (-5.894)	-100.323*** (-4.291)	-145.290*** (-4.751)	-98.733*** (-2.909)
POP	0.502 (0.782)	-0.266 (-0.502)	0.717 (0.860)	-0.288 (-0.453)	0.143 (0.267)	-0.274 (-0.632)
WHITE	-9.410*** (-4.241)	-5.879** (-2.424)	-7.162*** (-2.860)	-3.557 (-1.424)	-8.010*** (-3.554)	-3.516 (-1.371)
FEMALE	-21.132 (-0.571)	-14.879 (-0.404)	-48.986 (-0.973)	-27.596 (-0.707)	7.774 (0.226)	4.559 (0.120)
EDUCATION	-33.483*** (-3.588)	-42.683*** (-3.919)	-30.026*** (-2.999)	-60.811*** (-6.283)	-41.123*** (-3.948)	-36.848*** (-2.918)
INCOME_PER_CAP	-0.080 (-0.844)	0.022 (0.240)	-0.134 (-1.240)	0.052 (0.569)	0.006 (0.072)	0.050 (0.505)
SENIOR	43.410*** (4.756)	48.557*** (4.588)	37.135*** (3.218)	42.973*** (3.343)	39.603*** (4.017)	41.660*** (3.578)
MANUFACTURE	-13.122 (-1.522)	-7.759 (-0.948)	-26.406** (-2.497)	-17.401** (-2.020)	-9.150 (-0.969)	-7.135 (-0.761)
INFORMATION	4.399 (0.051)	30.322 (0.454)	88.637 (0.848)	117.165 (1.507)	-61.060 (-0.921)	-42.052 (-0.743)
INTERNET	9.664* (1.753)	10.150* (1.660)	-0.128 (-0.020)	3.153 (0.591)	16.882*** (2.957)	17.908** (2.243)
State × Disaster Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	128,989	233,046	58,453	107,027	69,317	125,020
Adjusted R^2	0.561	0.550	0.552	0.550	0.577	0.553

Table IA9: Robustness Test: Post-Disaster Supply of Cash-Out and Non-Cash-Out Mortgages

This table reports the estimated results of multinomial logit regressions of loan purpose choices among new purchases (base case), cash-out refinancing and non-cash out refinancing using the GSE sample. The dependent variable is an indicator variable equal to (i) zero if the purpose of the approved loan is new purchase; (ii) one if the purpose of the approved loan is cash-out refinance; and (iii) two if the purpose of the approved loan is non-cash-out refinance. Standard errors are clustered at the county level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	Fin/Tech								Shadow Banks				Traditional Banks				All Lenders				
	1		2		3		4		5		6		7		8		9		10		
	Cash-out	Refi	Non-cash-out	Refi	Cash-out	Refi	Cash-out	Refi	Non-cash-out	Refi	Cash-out	Refi	Non-cash-out	Refi	Cash-out	Refi	Non-cash-out	Refi	Cash-out	Refi	
TREAT × POST	0.368*** (2.89)		0.362*** (2.61)		0.355*** (3.11)		0.445*** (4.13)		0.311*** (3.31)		0.394*** (3.59)		0.317*** (3.32)		0.381*** (3.64)						
TREAT	-0.181** (-2.00)		-0.244*** (-2.70)		-0.151 (-1.55)		-0.140* (-1.69)		-0.190*** (-2.68)		-0.261*** (-4.04)		-0.170** (-2.46)		-0.222*** (-3.52)						
POST	-0.118* (-1.66)		-0.319*** (-3.94)		-0.150* (-1.90)		-0.250*** (-3.00)		-0.254*** (-4.34)		-0.342*** (-5.07)		-0.147*** (-2.70)		-0.258*** (-4.02)						
Controls	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes				Yes		
State × Disaster	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes				Yes		
Year FEs	110,122		110,122		85,157		85,157		271,145		271,145		467,077		467,077				467,077		
Observations	0.198		0.198		0.192		0.192		0.205		0.205		0.190		0.190				0.190		
Pseudo R ²																					

Table IA10: Performance of Post-Disaster Mortgages: Full Model Results

This table presents the complete Table 7. DELQ is a dummy variable that equals one if the loan has at least one record of 30 days (or longer) delinquent within six months of origination, and zero otherwise. TREAT is a dummy variable that equals one for disaster-affected areas, and zero for control areas. POST is a dummy variable that equals one for the six months following the natural disaster, and zero for the six months before the natural disaster. FINTECH is a dummy variable that equals one for FinTech loans, and zero otherwise. INT_RATE is the original mortgage interest rate minus the return on the 10-year Treasury note. DTI is the borrower's debt-to-income ratio, calculated as the borrower's monthly obligations (including housing expense) divided by her stable monthly income. FICO is the borrower's FICO score. CLTV is the borrower's combined loan-to-value ratio, calculated as all loans secured by the mortgaged property divided by the mortgage amount. TERM is the number of months in which regularly scheduled borrower payments are due under the terms of the related mortgage documents. ln(AMT) is the natural logarithm of the mortgage amount. BRANCH is the number of bank branches per 1,000 population by county. DEPOSITS is the amount of deposits per capita by county. HHI is the Herfindahl-Hirschmann index of deposits by county. C3 is the share of deposits in the three largest banks by county. UNEMP is the share of the labor force that is unemployed. POP is the population by county. WHITE is the share of white people by county. FEMALE is the share of female people by county. EDUCATION is the share of population over 25 years that is with high school or higher education. INCOME_PER_CAP is income per capita. SENIOR is the share of population that is over 65 years old. MANUFACTURE is the share of the labor force working in the manufacturing industry. INFORMATION is the share of the labor force working in the information industry. INTERNET is the share of households with residential fixed connections over 200kbps in at least one direction. Standard errors are clustered at the ZIP Code level and t-statistics are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, ** and ***, respectively.

	DELQ					
	Refinance		Cash-out Refinance		Non-cash-out Refinance	
	1	2	3	4	5	6
	Shadow Bank and FinTech	Bank and FinTech	Shadow Bank and FinTech	Bank and FinTech	Shadow Bank and FinTech	Bank and FinTech
TREAT × POST × FINTECH	0.420* (1.822)	0.413* (1.953)	0.372 (1.311)	0.322 (1.237)	0.412 (1.452)	0.484* (1.958)
TREAT × POST	0.021 (0.146)	-0.021 (-0.180)	0.072 (0.380)	0.082 (0.521)	0.021 (0.098)	-0.110 (-0.663)
TREAT × FINTECH	-0.422** (-1.980)	-0.576*** (-3.601)	-0.305 (-1.329)	-0.429** (-2.112)	-0.485* (-1.919)	-0.673*** (-3.739)
POST × FINTECH	-0.568*** (-3.842)	-0.405*** (-3.258)	-0.532*** (-2.904)	-0.375** (-2.260)	-0.568*** (-2.893)	-0.443*** (-2.916)
TREAT	0.065 (0.416)	0.231** (2.055)	0.031 (0.183)	0.147 (1.112)	0.058 (0.293)	0.273* (1.709)
POST	0.140 (1.267)	-0.024 (-0.250)	0.125 (0.900)	-0.013 (-0.117)	0.140 (0.799)	-0.028 (-0.190)
FINTECH	0.372*** (2.660)	1.214*** (11.348)	0.300** (2.009)	1.109*** (7.842)	0.393** (2.328)	1.305*** (11.390)

INT_RATE	0.006*** (9.284)	0.005*** (8.706)	0.004*** (6.051)	0.008*** (9.712)	0.006*** (8.234)
DTI	0.002 (1.075)	-0.000 (-0.060)	-0.001 (-0.290)	0.001 (0.522)	-0.000 (-0.106)
FICO	-0.006*** (-14.597)	-0.006*** (-16.319)	-0.007*** (-12.843)	-0.005*** (-8.221)	-0.006*** (-10.126)
CLTV	-0.001 (-0.860)	-0.003** (-2.216)	0.002 (1.128)	-0.004** (-2.124)	-0.005*** (-3.763)
TERM	-0.001*** (-3.550)	-0.001** (-2.119)	-0.000 (-0.115)	-0.002*** (-5.072)	-0.001*** (-2.988)
ln(AMT)	0.002*** (7.268)	0.002*** (4.349)	0.001*** (3.286)	0.003*** (7.944)	0.003*** (9.465)
BRANCH	0.000 (0.755)	0.000 (0.465)	-0.000 (-0.198)	0.001 (1.196)	0.001 (0.900)
DEPOSITS	-0.000 (-0.202)	0.001 (0.592)	0.002* (1.693)	-0.002 (-1.492)	-0.002 (-0.912)
HHI	0.164 (0.455)	0.187 (0.476)	-0.744* (-1.835)	1.073** (1.967)	1.085* (1.882)
C3	-0.090 (-0.328)	-0.384 (-1.393)	0.314 (0.945)	-0.428 (-1.075)	-0.805** (-2.196)
UNEMP	-3.860** (-2.558)	-3.511** (-2.226)	-6.261** (-2.441)	-2.206 (-1.724)	-3.283* (-1.667)
POP	0.044 (1.231)	0.019 (0.564)	0.086* (1.834)	0.032 (0.529)	-0.040 (-0.865)
WHITE	-0.679*** (-3.888)	-0.632*** (-3.040)	-0.775*** (-2.718)	-0.503*** (-2.487)	-0.540** (-2.289)
FEMALE	-1.606 (-0.518)	2.654 (0.981)	-1.103 (-0.280)	-0.844 (-0.194)	3.838 (1.027)
EDUCATION	1.033 (1.344)	0.228 (0.298)	0.475 (0.411)	1.670 (1.499)	0.845 (0.793)
INCOME_PER_CAP	-0.006 (-0.927)	-0.004 (-0.838)	-0.006 (-1.100)	-0.003 (-0.388)	-0.004 (-0.559)
SENIOR	0.745 (0.853)	1.967** (2.129)	0.891 (0.857)	0.513 (0.399)	0.419 (0.313)
MANUFACTURE	1.211 (1.394)	1.313* (1.652)	0.789 (0.689)	1.958* (1.688)	1.756 (1.577)
INFORMATION	2.816 (0.622)	8.108** (2.132)	1.685 (0.322)	7.008 (1.299)	12.188** (2.221)
INTERNET	0.595 (1.319)	0.412 (1.060)	0.834 (1.634)	0.328 (0.566)	0.136 (0.260)
State × Disaster Year FE	Yes	Yes	Yes	Yes	Yes
Observations	122,993	230,079	104,435	66,913	124,246
Adjusted R^2	0.042	0.056	0.055	0.042	0.065